What is claimed is:

[c01] 1. A tomosynthesis system for creating a reconstructed image of an object from a plurality of two-dimensional x-ray projection images, the system comprising:

an x-ray detector; and

an x-ray source capable of emitting x-rays directed at the x-ray detector,

wherein the tomosynthesis system utilizes asymmetric image acquisition geometry, where $\theta_1 \neq \theta_0$, during image acquisition, wherein θ_1 is a sweep angle on one side of a center line of the x-ray detector, and θ_0 is a sweep angle on an opposite side of the center line of the x-ray detector.

[c02] 2. The tomosynthesis system of claim 1, wherein the total sweep angle (φ_{asym}) is:

$$\varphi_{asym} = \theta_1 + \theta_0.$$

[c03] 3. The tomosynthesis system of claim 2, wherein φ_{asym} is about 40° to about 60°.

[c04] 4. The tomosynthesis system of claim 1, wherein the x-ray detector is positioned at a predetermined position so that images of a region of interest, as acquired during a sweep, are centered on a center of the x-ray detector.

[c05] 5. The tomosynthesis system of claim 4, wherein the predetermined position comprises at least one of: at a center of a patient's sternum, above the center of the patient's sternum; below the center of the patient's sternum; at a patient's stomach; at one or more of a patient's extremities; and at a patient's limb.

[c06] 6. The tomosynthesis system of claim 1, wherein the x-ray detector is tilted so as to be aimed at a center position of the total sweep angle (φ_{asym}).

[c07] 7. The tomosynthesis system of claim 1, wherein at least one of the x-ray source and the x-ray detector moves during image acquisition.

[c08] 8. The tomosynthesis system of claim 7, wherein at least one of the x-ray source and the x-ray detector moves in at least one of the following manners during image acquisition: along a one-dimensional path, along a two-dimensional path, along a three-dimensional path, along an arc, along at least a portion of a circle, along at least a portion of an ellipse, along at least a portion of a hypocycloid, along at least a portion of a line, along at least a portion of a sphere, and along at least a portion of a cone.

[c09] 9. The tomosynthesis system of claim 1, wherein the x-ray detector remains stationary during image acquisition.

[c10] 10. The tomosynthesis system of claim 1, wherein the object being imaged moves during image acquisition, while both the x-ray source and the x-ray detector remain stationary during image acquisition.

[c11] 11. The tomosynthesis system of claim 1, wherein at least one of the x-ray source and the x-ray detector moves in a translational or rotational manner during image acquisition.

[c12] 12. The tomosynthesis system of claim 1, wherein x-ray scanning occurs in at least one of the following directions: vertically, horizontally, and obliquely.

[c13] 13. The tomosynthesis system of claim 1, wherein a reconstruction algorithm produces a reconstructed image of the object from the plurality of two-dimensional x-ray projection images.

[c14] 14. A tomosynthesis method for creating a reconstructed image of an object from a plurality of two-dimensional x-ray projection images, the method comprising:

providing an x-ray detector;

providing an x-ray source capable of emitting x-rays directed at the x-ray detector; and

utilizing asymmetric image acquisition geometry, where $\theta_1 \neq \theta_0$, during image acquisition, wherein θ_1 is a sweep angle on one side of a center line of the x-ray detector, and θ_0 is a sweep angle on an opposite side of the center line of the x-ray detector.

[c15] 15. The tomosynthesis method of claim 14, wherein the total sweep angle (φ_{asym}) is:

$$\varphi_{asym} = \theta_1 + \theta_0.$$

[c16] 16. The tomosynthesis method of claim 15, wherein φ_{asym} is about 40° to about 60°.

[c17] 17. The tomosynthesis method of claim 14, further comprising:

positioning the x-ray detector at a predetermined position so that images of a region of interest, as acquired during a sweep, are centered on a center of the x-ray detector.

[c18] 18. The tomosynthesis method of claim 17, wherein the predetermined position comprises at least one of: at a center of a patient's sternum, above the center of the patient's sternum; below the center of the patient's sternum; at a patient's stomach; at one or more of a patient's extremities; and at a patient's limb.

[c19] 19. The tomosynthesis method of claim 14, further comprising:

tilting the x-ray detector so it is aimed at a center position of the total sweep angle (φ_{asym}).

[c20] 20. The tomosynthesis method of claim 14, further comprising:

moving at least one of the x-ray source and the x-ray detector during image acquisition.

[c21] 21. The tomosynthesis method of claim 20, further comprising:

moving at least one of the x-ray source and the x-ray detector in at least one of the following manners during image acquisition: along a one-dimensional path, along a two-dimensional path, along a three-dimensional path, along an arc, along at least a portion of a circle, along at least a portion of an ellipse, along at least a portion of a hypocycloid, along at least a portion of a line, along at least a portion of a sphere, and along at least a portion of a cone.

[c22] 22. The tomosynthesis method of claim 14, further comprising:

holding the x-ray detector stationary during image acquisition.

[c23] 23. The tomosynthesis method of claim 14, further comprising:

moving the object being imaged during image acquisition, while holding both the x-ray source and the x-ray detector stationary during image acquisition.

[c24] 24. The tomosynthesis method of claim 14, further comprising:

moving at least one of the x-ray source and the x-ray detector in a translational or rotational manner during image acquisition.

[c25] 25. The tomosynthesis method of claim 14, wherein x-ray scanning occurs in at least one of the following directions: vertically, horizontally, and obliquely.

[c26] 26. The tomosynthesis method of claim 14, further comprising:

utilizing a reconstruction algorithm to produce a reconstructed image of the object from the plurality of two-dimensional x-ray projection images.